

Mojave Monkeyflower (*Mimulus mohavensis*)

Legal Status

State: None
California Rare Plant
Rank: 1B.2¹
Federal: BLM Sensitive
Critical Habitat: N/A
Recovery Planning: N/A



Photo courtesy of Steve Schoenig.

Taxonomy

Mojave monkeyflower (*Mimulus mohavensis*) was originally described by John Gill Lemmon in 1884 (Lemmon 1884; IPNI 2011). It is a distinctive member of the genus that was previously placed in its own section (Beardsley et al. 2004). Until recently, Mojave monkeyflower was included in the figwort family (*Scrophulariaceae*), but it is now placed in the lopseed family (*Phrymaceae*) (Beardsley and Olmstead 2002; Jepson Flora Project 2011). There are also current studies that provide evidence that the genus *Mimulus* should be fragmented into several new genera, so more nomenclatural changes can be expected in the near future for this taxon.

Mojave monkeyflower is an annual plant approximately 2 to 10 centimeters (0.8 to 3.9 inches) in size. A full physical description of the species can be found in the Jepson Flora Project (2011).

Distribution

General

This species occurs in the Mojave Desert in west-central San Bernardino County (Jepson Flora Project 2011). The populations with greatest known densities occur south of Daggett and Barstow (MacKay 2006). However, the majority of the historical occurrences

¹ **1B:** Rare, threatened, or endangered in California and elsewhere; **X.2:** Fairly endangered in California.

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in the Barstow area have either been extirpated or impacted (CNPS 2011). The elevation range of this species extends from 600 to 1,200 meters (1,969 to 3,937 feet) (CNPS 2011) (Figure SP-P10). There are a total of 56 California Natural Diversity Database (CNDDB) occurrences for Mojave monkeyflower at 121 localities, all of which occur in the Plan Area.

Distribution and Occurrences within the Plan Area

Historical

Eleven localities have not been observed since 1990. Of these, one site at Kane Springs (Element occurrence 6) was visited more recently (in 2011) and no plants were found so it is uncertain whether any plants occur here. However, the Kane Springs resurvey in 2011 with negative results does not mean the plants are not in the vicinity (MacKay, pers. comm. 2012). One occurrence along Camp Road is not dated and no plants were found at this site in 1986 or in 1998. Moore (pers. comm. 2012) stated that areas off of Camp Rock Road on the smaller BLM roads represent important Mojave monkeyflower habitat because they have very low levels of disturbance in comparison to those on Camp Rock Road. Another historical occurrence is the type locality in Calico and is likely extirpated (CDFW 2013). These records extend from the area around Barstow southeast to the area around the Newberry Mountains, and one occurrence much farther south near Old Woman Springs (Figure SP-P10; CDFW 2013).

Recent

Of the 121 total CNDDB localities in the Plan Area, 110 have been recorded in the CNDDB since 1990 and are presumed extant. One of the major populations of Mojave monkeyflower recorded in the CNDDB since 1990 that is presumed extant is located southeast of Barstow to Ord Mountain. A second concentration of occurrences is located northeast of Adelanto and extends to Helendale. There is an isolated occurrence just south of the Black Mountains summit (Figure SP-P10). However, if the Stoddard Open Off-Highway Vehicle (OHV) area were surveyed there is a high likelihood that Mojave monkeyflower would be documented, providing a continuum of distribution between the two major areas (MacKay, pers. comm. 2012). The disjunct distributions are

the Kane Springs collection east of Rodman (Element occurrence 6) and the Old Woman Springs collection; both areas still need field work (MacKay, pers. comm. 2012).

According to CNDDDB records (CDFW2013), of the 47 current occurrences at 110 localities, the vast majority are on lands managed by the Bureau of Land Management (BLM), and the remaining portion are on lands that are privately owned or whose ownership is unknown (CDFW 2013). However, 14 of the 19 occurrences turned in by B. West (BLM employee at the time, 1992) included information that the BLM-owned lands were under consideration for disposal, and BLM subsequently disposed of the land containing four of those occurrences (CDFW 2013; MacKay, pers. comm. 2012). Also, there is a very high probability that the remaining Brisbane Valley is occupied by Mojave monkeyflower (MacKay, pers. comm. 2012).

Natural History

Habitat Requirements

This species occurs in Mojavean desert scrub, specifically creosote bush scrub (MacKay 2006; CNPS 2011). Mojave monkeyflower is associated with the following species or genera, among others: creosote bush (*Larrea tridentata*), desert senna (*Senna armata*), cheese bush (*Ambrosia salsola*), ratany (*Krameria erecta* and *K. bicolor*), chollas (*Cylindropuntia* spp.), burro bush (*Ambrosia dumosa*), prairie-clovers (*Psoralea* spp.), Bigelow's monkeyflower (*Mimulus bigelovii*), desert bells (*Phacelia campanularia*), desert fivespot (*Eremalche rotundifolia*), spiny hopsage (*Grayia spinosa*), and desert trumpet (*Eriogonum inflatum* var. *inflatum*) (MacKay 2006; CDFW 2013).

Mojave monkeyflower commonly occurs in areas that are not subject to regular water flow (MacKay 2006). These areas include the gravelly banks of desert washes with granitic soils and rocky slopes above washes, as well as the sandy openings of creosote bush scrub (MacKay 2006).

Table 1. Habitat Associations for Mojave Monkeyflower

| Land Cover Type | Habitat Designation | Habitat Parameters | Supporting Information |
|--|---------------------|----------------------------------|---|
| Mojavean desert scrub, Creosote bush scrub | Primary habitat | Granitic soils, 1,968–3,937 feet | MacKay 2006; CNPS 2011; Jepson Flora Project 2011 |

Reproduction

Germination is probably dependent upon the amount of precipitation, as population sizes can vary substantially from year to year (MacKay 2006).

Most members of the lopseed family are insect pollinated (Beardsley and Olmstead 2002); and given the showy flowers, Mojave monkeyflower pollinators are probably Hymenoptera (bees, wasps, ants, and sawflies) or Lepidoptera (butterflies and moths). MacKay (2006) hypothesized that the white margin of the corolla reflects ultraviolet light, and the maroon veins extending into this margin act as nectar guides to facilitate pollination.

Small seeds and an annual habit suggest that dispersal of Mojave monkeyflower is mostly abiotic (MacKay 2006; NatureServe 2010). For populations located on rocky slopes above washes, it is probable that gravity carries seeds down into the washes and intermittent water flow may carry seeds further down washes. Although biotic vectors of seed transport are unknown, granivorous ants or rodents may transport seeds over short distances and birds may transport seeds longer distances (MacKay 2006).

Ecological Relationships

Although suitable habitat for this species appears to be fairly abundant, it is quite restricted geographically. Population sizes fluctuate substantially from year to year, probably in response to the amount and timing of precipitation; as an annual, germination and establishment are dependent on the timing and amount of spring rains (MacKay 2006; NatureServe 2010). Unknown unusual germination and establishment requirements may account for the considerable variability in population sizes from year to year (MacKay 2006).

Population Status and Trends

Global: G2, Imperiled (NatureServe 2011, Conservation Status last reviewed 2006)

State: S2, Imperiled (CDFG 2012b)

Population trends for Mojave monkeyflower are unknown at present, but a multi-year population-level study is underway by BMP Ecosciences (Moore et al.) and expected to be completed by 2015. One CNDDDB locality has been possibly extirpated, and the status of 11 of the 121 total CNDDDB localities of Mojave monkeyflower in the Plan Area have not been updated since 1990 (CDFW 2013; MacKay 2006).

Threats and Environmental Stressors

Threats to Mojave monkeyflower include development, mining, non-native plants, solar and wind energy projects, grazing, vehicles, and road development (CNPS 2011; NatureServe 2010; MacKay 2006). Additional potential threats include pipeline installation and quarries and test pits adjacent to populations (MacKay 2006). Mojave monkeyflower is also under threat by the potential for the BLM to convert land occupied by this species to private lands, which could then be developed (MacKay 2006; CDFW 2013). The area under consideration for disposal or land exchange is located between Barstow and Victorville (CDFW 2013).

Because population sizes fluctuate considerably annually in response to environmental conditions, Mojave monkeyflower is susceptible to depletion of the seed bank after a series of drought years. In addition, small population sizes increase the risk of inbreeding, which may result in reduced seed set or reduced seed viability (MacKay 2006).

Conservation and Management Activities

The West Mojave Plan designated Mojave monkeyflower conservation areas in the Plan Area as land managed by BLM (BLM 2005). The Brisbane Valley Mojave Monkeyflower Conservation Area is 10,448 acres and the Daggett Ridge Mojave Monkeyflower Conservation Area is 25,351 acres (BLM 2006).

Data Characterization

In general, data availability for the Mojave monkeyflower is poor. The pollination ecology of Mojave monkeyflower is unknown (MacKay 2006). This species may have some unusual germination and establishment requirements that are unknown (MacKay 2006). Mojave monkeyflower is also absent from much apparently suitable habitat and remains relatively restricted geographically (MacKay 2006).

The status of many of the recorded populations of Mojave monkeyflower is unknown. Several occurrences documented in the CNDDDB may be extirpated but still presumed extant in the database (MacKay 2006). In addition, location data may be inaccurate, especially for older records labeled Barstow; these collections may actually be from the vicinity of Barstow, and not from what is now the town of Barstow (MacKay 2006).

Management and Monitoring Considerations

Protection of the areas where Mojave monkeyflower is known to occur is important to maintain viable populations of the species. The species would likely benefit from the elimination of off-road vehicle use and livestock grazing in occupied areas south of Barstow and Daggett, as well as maintenance of BLM management of lands between the Mojave River and Interstate 15 between Victorville and Barstow. Management and monitoring are complicated by the year-to-year fluctuations in population size in response to rainfall. A very important consideration is to fully understand where populations occur. Vast and thorough surveys should be conducted during the appropriate flowering season in good rainfall years (MacKay, pers. comm. 2012). Confirmation of site occupancy in suitable habitat should be conducted over multiple years before concluding absence. Moore et al. (in prep) found that novel occurrence discoveries in modeled suitable habitat were strongly predicted by the proximity to recent occurrences.

Species Modeled Habitat Distribution

This section provides the results of habitat modeling for Mojave monkeyflower, using available spatial information and occurrence

information, as appropriate. For this reason, the term “modeled suitable habitat” is used in this section to distinguish modeled habitat from the habitat information provided in Habitat Requirements, which may include additional habitat and/or microhabitat factors that are important for species occupation, but for which information is not available for habitat modeling.

There are 176,190 acres of modeled suitable habitat for Mojave monkeyflower in the Plan Area. Appendix C includes a figure showing the modeled suitable habitat in the Plan Area.

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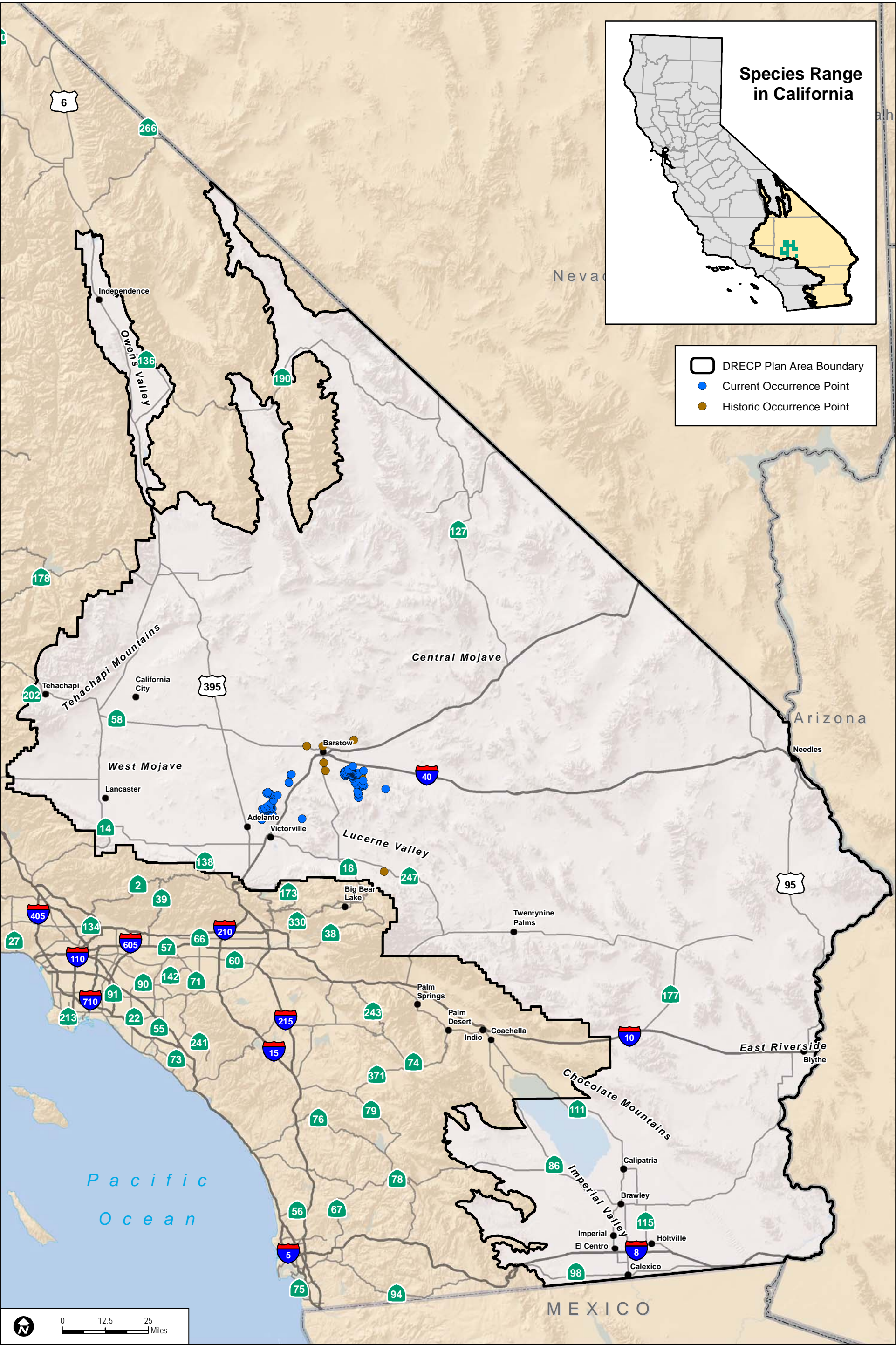
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Sources: ESRI (2014); DRECP Species Occurrence Database (2013), CWHR (2008)

FIGURE SP-P06
Mojave Monkeyflower Occurrences in the Plan Area